Original scientific paper

UDC:
xxx
xxx

Received: July 28, 2025.
Revised: November 21, 2025.
Accepted: December 05, 2025.

10.23947/2334-8496-2025-13-3-793-810

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Screening Tool Facilitating Mainstream School Practitioners to Assess Educational Needs of Children With Autism Spectrum Disorders: The Bulgarian Case

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Abstract: Over the years, research has demonstrated that individuals with autistic spectrum disorders are a heterogeneous group. In recent years, the concept of inclusive education has provided additional insight into the possibilities of working with children with ASD in mainstream schools. The purpose of this study is to outline the specific strengths, capacities, and opportunities for supporting children and students with ASD in mainstream schools. The Classification of Functioning, Disability, and Health for Children and Youth (ICF-CY) indicators were used as a basis and applied to different forms of ASD diagnosis, looking for more detailed individual profiles and common resources outlined despite the possible differences by gender, age, diagnoses, and according to specific difficulties and areas where children and students have difficulties. Sample comprised 201 children and students, aged 3-19 years. The results highlight the strengths and resources of a large number of the respondents with ASD, outlining their capacity in communication, language mastery and thinking. From one-fifth to more than half of the respondents do not encounter challenges when the environment and context are supportive. The reported results highlight the implications of the universal tool that teachers and educators have for thorough and in-depth outlining the personal development scope and areas. It can serve as a screening instrument in mainstream setting, alerting mainly teachers, but also families about the measures that address needs of children and students with ASD in view to facilitate personal growth.

Keywords: *children with Autism Spectrum Disorder, inclusive environment, Classification of Functioning, Disability, and Health for Children and Youth (ICF-CY).*

Introduction

The diagnostic profiles of children with autism spectrum disorder (ASD) reveal a spectrum of challenges that underscore the complexity of their educational requirements. Most notably, communication deficits manifest through limited social engagement and difficulties in comprehending verbal cues, necessitating individualised interventions tailored to each child's unique profile (Bagetti et al., 2023). These profiles often highlight a reliance on specific support frameworks, such as those aligned with the International Classification of Functioning, Disability, and Health for Children and Youth (ICF-CY), to ensure effective inclusion in educational settings. The heterogeneity observed in social interactions indicates not only a need for targeted language development programs but also emphasises fostering emotional regulation and cognitive skills, which are critical for academic achievement. Overall, understanding these diagnostic profiles is crucial for developing long-term support strategies to enhance the educational outcomes and social adaptation of children with ASD.

The diagnostic criteria for ASD have evolved significantly, particularly with the publication of the DSM-5, which redefines ASD as a single continuum rather than a collection of distinct categories. This modification aimed to streamline the diagnostic process and reflect the heterogeneous nature of the

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spectra. Current criteria necessitate the presence of symptoms in two critical domains: social communication and restricted, repetitive behaviours, which must manifest in early developmental periods and cause functional impairments in daily life (Durkin, 2019). Recent analyses emphasise the necessity for a multidimensional approach to assessment, considering cognitive, emotional, and social factors indicative of each child's unique profile. Furthermore, the utilisation of frameworks such as the International Classification of Functioning, Disability, and Health for Children and Youth (ICF-CY) has underscored the significance of context in understanding the educational and interpersonal needs of children with ASD, thus advocating for inclusive strategies that consider individual variability.

The heterogeneity in symptomatology and behavioural manifestations among children with Autism Spectrum Disorder (ASD) presents significant challenges for both diagnostic processes and intervention strategies. Individuals on the autism spectrum exhibit a diverse range of communication difficulties, social interaction impairments, and behavioural issues, necessitating a nuanced understanding of their individual needs to effectively tailoring educational strategies. Research indicates that this heterogeneity frequently involves limited social engagement, whereby numerous children avoid peer contact and experience difficulties with group participation, underscoring the need for targeted interventions to foster social skills and inclusion. Furthermore, deficits in cognitive and emotional regulation can impede children's ability to manage daily activities, as they frequently encounter challenges in maintaining attention and coping with frustration. As noted in the literature, employing assessment tools such as the Adaptive Behaviour Assessment System (ABAS-3) can provide a comprehensive framework to evaluate functioning and guide individualised support, ensuring that each child's educational experience is appropriately customised (Shah et al., 2019).

The role of early diagnosis in educational planning for children with ASD is pivotal, as it enables tailored interventions that align with the unique needs of each child. Early identification facilitates the implementation of specific educational strategies that consider not only the diagnostic criteria but also the broader biopsychosocial context, as emphasised in the International Classification of Functioning, Disability, and Health for Children and Youth (ICF-CY) (Mahdi et al., 2018; Vallefuoco et al., 2022). Research has demonstrated that children experience significant challenges in communication and social interactions, often necessitating individualised educational frameworks that promote engagement. Furthermore, effective educational planning incorporates insights into environmental factors, as these contexts significantly influence children's participation and functionality in educational settings. The emphasis on early diagnosis underscores the importance of a proactive approach that enables educators and caregivers to foster holistic development and support inclusion, thereby addressing both immediate and long-term educational needs.

Multidisciplinary assessments are crucial in developing comprehensive diagnostic profiles for children with Autism Spectrum Disorders (ASD), as they provide a holistic view of an individual's strengths and challenges. By incorporating insights from various professionals, such as clinicians, educational specialists, and therapists, these assessments lead to tailored interventions that address the diverse needs of autistic children (Mahdi et al., 2018; Balsa, 2023). For instance, the analysis of functional profiles utilising the ICF-CY highlights significant variations in social and communicative capabilities among children, revealing that many experience difficulties in initiating social contact and participating in group activities. Additionally, the findings emphasise the necessity of individualised support, as children often require long-term assistance in language development and emotional regulation. This multidisciplinary approach not only enhances documentation and evaluation processes but also aligns interventions more closely with the real-world complexities faced by children with ASD, facilitating their long-term inclusion and support. Accurate diagnosis of ASD is fraught with challenges, significantly compromising the efficacy of long-term support and inclusion strategies, as outlined by the ICF-CY framework. The diagnostic variability can result from overlapping symptoms with other developmental disorders and a lack of standardised assessment tools, which complicates the determination of individuals' functional abilities. Further complicating matters are the acknowledged heterogeneity among children with ASD, where individual differences in communication, social skills, and cognitive functioning necessitate personalised diagnostic approaches (Hayden-Evans et al., 2022). Additionally, environmental factors, ranging from familial support to school contexts, play a crucial role in shaping the developmental trajectories of these children, underscoring the necessity for a framework that considers these variables. Moreover, the need for long-term interventions that address specific challenges in communication and emotional regulation emphasises the critical nature of accurate initial diagnoses to effectively tailor educational support.

Autism Spectrum Disorders (ASD) encompass a range of neurodevelopmental conditions characterised by impairments in communication, social interaction, and repetitive behaviours. The heterogeneity of ASD manifests variably across individuals, influencing their daily functioning and quality of life. This complexity is reflected in the increasing prevalence of ASD diagnoses and the subsequent increase in the educational support requirements of the affected children. Research indicates that children with ASD typically experience challenges in communication, attention, and social skills, necessitating tailored interventions. Moreover, factors such as social engagement, emotional regulation, and cognitive flexibility play critical roles in their development, underscoring the necessity for an inclusive educational framework that accommodates these diverse needs. Utilising the International Classification of Functioning, Disability and Health (ICF-CY) framework allows for a comprehensive understanding of how environmental and personal factors interact with the core characteristics of ASD, ultimately guiding effective support strategies (Viljoen, 2019; Krieger, 2022).

Understanding the intricacies of diagnostic profiles is essential for effectively meeting the educational requirements of children with ASD, as these profiles encompass each child's distinct challenges and abilities. Thorough evaluations reveal considerable variation in social and communicative skills, directly shaping individualised educational approaches. This underscores the need for bespoke interventions to bolster various aspects of communication, emotional management, and social integration. Employing frameworks such as ICF-CY provides a more profound understanding of how children's impairments interact with their daily activities, stressing the importance of continuous support across various contexts. This comprehension forms the foundation for effective long-term strategies to improve academic and social outcomes, ensuring that children with ASD flourish in inclusive settings (Okoye et al., 2023; Narciso et al., 2024). Furthermore, as noted in, acknowledging in symptom presentation can inform the creation of targeted interventions, further emphasising the importance of personalised support tailored to specific diagnostic profiles.

The educational needs of children with ASD are highly complex, influenced by a multitude of factors, including individual capabilities, environmental influences, and social contexts. Evidence suggests that interventions tailored to the unique profiles of these children can significantly enhance their learning experiences and overall functionality. Critical areas of focus include language development, social skills, and emotional regulation, as children frequently experience difficulties in communication and social interactions. Furthermore, the International Classification of Functioning, Disability, and Health for Children and Youth (ICF-CY) emphasises that contextual elements play a crucial role in shaping educational outcomes (Viljoen, 2019). Differences in functional abilities are frequently observed across gender lines, necessitating gender-sensitive approaches to educational strategies (Buxbaum , 2021). Bystrova et al. (2017) confirmed that children with ASD have specific features of visual perception irrespective the level of intelligence and perceive graphic images differently, is important for the school educational environment

Addressing these diverse needs through individualised education plans can facilitate both inclusion and long-term support for children with ASD within educational settings (Erasmus, 2018; Hasson et al., 2022).

The traditional deficit-based model of autism has increasingly been challenged by the neurodiversity paradigm, which conceptualizes autism as a natural variation in human cognition and emphasizes the need to support autistic strengths within inclusive environments (Pellicano and den Houting, 2022). The authors advocate for greater emphasis on contextual factors—such as sensory-friendly settings and inclusive educational practices—rather than narrowly targeting individual deficits. They also highlight the importance of participatory research approaches, exemplified by Australia's Autism CRC, which aligned research agendas with community-defined priorities and invested in lifespan-oriented supports co-developed with autistic individuals.

Autism's heterogeneity has also received growing attention. For example, the shift to a single ASD diagnosis in DSM-5 has been critiqued for obscuring meaningful subgroups. A dimensional approach—considering variables such as language ability, intellectual level, gender, and comorbidities—can better capture individual differences and guide tailored and individualized interventions (Lai et al., 2013).

Recent neuroimaging studies further support autism's complexity. Using resting-state functional MRI and regularized canonical correlation analysis (rCCA), researchers identified three key brain–behavior dimensions—verbal IQ, social affect, and restricted and repetitive behaviors (RRB)—and four reproducible autism subtypes with distinct neural and gene expression profiles: (1) high verbal IQ with elevated RRB; (2) low verbal IQ with elevated RRB; (3) high social-affect symptoms with low RRB; and (4) low social-affect symptoms with high RRB. Transcriptomic analyses showed that each subtype was associ-

ated with unique gene expression patterns, pointing to molecularly and neurofunctionally distinct forms of autism (Buch et al., 2023). These findings underscore the neurobiological heterogeneity of ASD and challenge its conceptualization as a uniform condition, highlighting the value of dimensional and subtype-specific approaches in research and intervention.

Recent research has placed greater emphasis on learning environments and inclusive education, highlighting the critical role of educational context and individualized support in promoting positive outcomes for autistic students. Lohmann et al. (2023) studied the use of Universal Design for Learning (UDL) in inclusive preschool science classrooms, showing that UDL strategies support diverse learners, including children with ASD, by enhancing engagement and understanding. Their findings provide empirical support for UDL's role in early inclusive education (Lohmann et al., 2023).

Similarly, differentiated instruction - adapting teaching methods, materials, and assessments to students' individual needs - has been shown to significantly improve task completion, academic engagement, and performance for children with ASD (Ameen, 2024). Furthermore, multi-sensory teaching grounded in a neurodiversity perspective supports greater engagement and learning for neurodiverse students with ASD (Sewell, 2022).

In a multicenter study across 10 countries (N = 122), clinicians used the ICF–CY checklist to assess functioning in individuals with ASD, identifying 139 relevant categories across body functions, activities, and environmental factors. The results underscore the heterogeneity of ASD and support the use of the ICF–CY as a comprehensive framework for individualized support and inclusive education planning (Mahdi et al., 2018).

The findings of our study align with the results of an international clinical investigation by Mahdi et al. (2018), which applied the ICF-CY framework to assess functioning in individuals with ASD across diverse cultural contexts. Their study identified a broad range of relevant categories, highlighting significant variability in abilities, support needs, and environmental influences. This reinforces our focus on identifying individual strengths and contextual facilitators in children and students with ASD. Like their findings, our results emphasize that many autistic individuals demonstrate competencies in areas such as communication, cognitive processing, and learning—particularly when supported by inclusive, well-adapted environments.

The focus of the contemporary approach to managing ASD has been directed on a bio-psycho-social framework that considers an individual's abilities and disabilities as a result of the interaction between health, environment and personal factors (WHO, 2001; WHO, 2007) and the creation of the International Classification of Functioning, Disability and Health (ICF). An example of work in this direction is a series of international studies (Mahdi et al., 2018) and studies in other countries involving experts worldwide (Bölte et al., 2014) with the aim of adapting the International Classification of Functioning, Disability and Health (ICF) guidelines for autism spectrum disorders (ASD) and, specifically, functioning in autism (as operationalised by the ICF), drawn from the perspective of diagnosed individuals, family members and professionals.

The provision of long-term support and inclusion for children with ASD is essential for fostering optimal developmental outcomes and enhancing the quality of life for both the child and their family. Comprehensive interventions that extend beyond the initial diagnosis are critical; they assist in addressing not only academic challenges but also the social and emotional deficits that characterise the disorder. Research indicates that children with ASD often require individualised support, including tailored educational strategies and consistent adult supervision, to promote engagement and participation in diverse settings. Moreover, the ICF-CY framework underscores the importance of contextual factors in evaluating the functionality and capabilities of these children, which encompasses their sustainability in educational environments and community life (Damyanov, 2024). Ongoing support not only mitigates behavioural challenges but also facilitates meaningful peer interactions, contributing to the child's overall well-being and social integration.

The ICF-CY provides a comprehensive framework for assessing the diverse needs of children, particularly those diagnosed with ASD. This classification model emphasises the significance of understanding not only disabilities but also the functional capacities and social participation of children, enabling a more holistic approach to intervention and support. The heterogeneity of ASD, highlighted in the ICF-CY framework, reveals substantial variations in social interactions and communication abilities among the affected children, necessitating tailored educational strategies. Furthermore, ICF-CY underscores the critical role of contextual factors in shaping developmental outcomes and emphasises the necessity for individualised support mechanisms (Nugent, 2016; Dale, 2021). Utilisation of this classification system can facilitate enhanced identification of specific educational requirements, thereby assisting educators

and clinicians in fostering inclusive environments that promote meaningful participation for children with ASD. Table 1 describes the main areas of challenges (Damyanov et al., 2023).

Table 1. *ICF-CY Dimensions and Functioning Levels*

Dimension	Functioning Level	Example	Prevalence Rate
Body Function	Functions related to mental and behavioural performance	Cognitive functioning, emotional regulation	Approximately 70% of children with ASD exhibit challenges in this area
Activities	Capabilities to execute tasks or actions	Learning, communication, self-care	Over 40% of children with ASD have significant difficulties
Participation	Involvement in life situations	Engagement in social activities, schooling	Estimated 30% of children with ASD experience barriers
Environmental Factors	External factors influencing functioning	Support from family, educational settings	Positive support can reduce challenges for up to 50% of children

The ICF serves as the basis for assessing and measuring disability. In recent years, research has been conducted to nationally adapt assessment tools according to the World Health Organization's International Classification of Functioning, Disability, and Health (ICF), including its version for children and youth, e.g. in Taiwan (Hwang et al., 2015). In some studies, a differentiation was made, with those trained to implement the Identification Card comprising only teachers; the Functional Diagnosis group only of multidisciplinary health professionals from Disability Services; and the group for the Achievable Functional Goal Profile and Individual Education Action Plan being heterogeneous in composition and comprising both teachers and operators from Disability Services (Mohapatra and Dwivedi, 2024). Some research has pointed towards creating a single disability variable for children with varying degrees of disability, ICD-10 diagnoses, and age using the WHO ICF-CY coding system for bodily functions (Illum and Gradel, 2015). Other ICF-CY-based studies have focused on specific conditions. An example is the functioning of individuals with autism spectrum disorder (ASD) are the research, conducted with representatives from 10 countries (Mahdi et al., 2018) and assessment of adults activity and participation in Taiwan (Liao et al., 2022), the degree of functioning of children and their families in Argentina (Napoli et al., 2021). Studies are also focused on other groups with disabilities, eg. such as cerebral palsy (Schiariti et al., 2014). Studies are also being conducted not only to adapt and validate, but also to monitor the applicability of the International Classification of Functioning, Disability and Health, version for Children and Youth (ICF-CY). An example is social and scholastic inclusion for students with disability in Treviso province, Italy (De Polo et al., 2009).

In this article are reported the results concerning the implementation of ICF-FY by teachers and educators as a part of the teams, ensuring personal development in mainstream inclusive setting.

Understanding the diagnostic profile and educational needs of children with Autism Spectrum Disorders (ASD) necessitates a comprehensive examination of their distinctive characteristics and challenges. The prevalence of ASD has drawn significant attention to the importance of tailored educational strategies that address individual needs, particularly within the framework of the International Classification of Functioning, Disability, and Health for Children and Youth (ICF-CY). This model emphasises the multifaceted nature of autism and elucidates how environmental, social, and personal factors interact to influence educational outcomes. As children with ASD frequently exhibit various impairments in communication, social interactions, and emotional regulation, effective long-term support systems must be designed to foster inclusion and participation. Consequently, this survey aims to analyse the critical role of long-term educational interventions, emphasising the necessity for specialised approaches that promote holistic development and social adaptation of children with ASD in inclusive settings.

Materials and Methods

This research is based on a field study conducted during the implementation of functional assessments of children and students with special educational needs in kindergartens and schools by a team from the Regional Center for Support of the Process of Inclusive Education (RCSPIE) in Sofia City. The assessment process took place between September 2023 and October 2024 and included the assessment of 201 children and students diagnosed with autism spectrum disorder between the ages of 3 and 19. This fieldwork provided substantial empirical data on the diverse educational and developmental needs of children with ASD, further informing discussions about effective intervention strategies in inclusive educational settings.

The functional scorecard based on the Bulgarian Model of Inclusive Education administered in this study is designed for quantitative and qualitative indicators measuring child and adolescent development, allowing for detailed profiling and collection of in-depth information that can be used for individual profiling.

The instrument applied in this study is the Functional Assessment Map of the Individual Needs of Children and Students with Special Educational Needs and Chronic Diseases, officially developed and implemented in Bulgaria in 2023 under the national project "Support for Inclusive Education," funded by the Ministry of Education and Science. The instrument is based on the International Classification of Functioning, Disability, and Health for Children and Youth (ICF-CY) developed by the World Health Organization (WHO, 2007), and adopts its bio-psycho-social model and coding structure.

The construction of the tool involved a multistage expert validation process, including:

- Multidisciplinary expert contributions (special educators, psychologists, speech therapists, occupational therapists, physicians, and social workers);
- External academic review by leading national scholars in the field;
- Pilot testing in partnership with UNICEF Bulgaria, involving specialists from regional support centers.

The instrument is conceptually validated by design through the ICF-CY framework and adapted to the Bulgarian educational context.

With regard to psychometric properties, inter-rater reliability is supported by mandatory national standardized training for all evaluators. The assessment teams operate through interdisciplinary discussions, applying clearly defined scoring guidelines. For preliminary screenings, a binary system is used (e.g., presence or absence of special needs indicators), while for full assessments, the standard ICF-CY ordinal qualifiers (0–4) are applied for each domain.

Training for raters was delivered by master trainers certified by the Ministry of Education and Regional Centers for Support of Inclusive Education. The training includes both theoretical and practical modules, emphasizing consistent application of the rating procedures and ensuring calibration among raters.

In this stage of the study, descriptive and categorical analyses were employed to present preliminary profiles of the assessed population. In future stages of the project, more advanced statistical methods such as regression analysis and multivariate models will be applied to explore deeper relationships between the functional domains, contextual factors, and educational outcomes.

Research aim

The *aim* of the study is to produce initial findings, highlighting the role of teachers and educators in inclusive environment and early screening and intervention, and:

1. provide optimal individualized profiling of strengths and weaknesses in the process of development and interaction with children and students with ASD according to the criteria set out in the functional scorecard;
2. facilitate professionals in the recognition and management of their observations in the process of interaction with children with ASD;
3. outline the common features and abilities, irrespective the specificities of gender, age and type of ASD.

The *research questions* are:

RQ1: What specific common strengths, difficulties and resources can be highlighted and are there clear gender, age and ASD specificities?

RQ2: What improvements can be made in the diagnostic process to track the personal development of children and students with ASD?

RQ3: What conclusions can be drawn to support professionals and mainstream teachers to support the individual potential of each child and student with ASD?

Method

ICF-FY based functional scorecard developed for Bulgaria was administered. There are 7 general indicators, each of which contains sub-indicators), shown in table 2.

Table 2. *Description of the respondents*

	ICF-FY based indicators	Sub-indicators
1.	Language - structure of language, rules	remembers abstract concepts, imitates sounds and phrases, lack of speech, finds the right word, unintelligible speech, grammatically incoherent speech, understands meaning when reading, understands new concepts, uses speech for communicative purposes, merges sounds, composes sentences, sound analysis and synthesis
2	Thinking	organizational skills, putting information into practice, understanding cause and effect relationships
3	Interpersonal Interactions	emotional regulation, initiating and responding appropriately to social interactions, responding to physical contact in a socially acceptable manner, socially acceptable behaviour
4	Attention and perceptions	holds attention briefly, has difficulty sitting still in class, does not listen or respond to instructions, relies on peers and copies their actions
5	Educational outcomes	has difficulty in only some areas, learns on an individual plan, works cooperatively with other children, copes with group tasks
6	Social communication	uses inappropriate voice volume/intonation, makes off-topic comments, maintains conversation, changes topic frequently, laughs at inappropriate times/rude, deliberate use of eye contact
7	Auditory memory	forgets instructions, needs constant guidance

Sample

A total of 201 respondents between the ages of 3 and 19 were surveyed, and assessments were requested by their parents following a request for additional personal development support in all areas of the country. As the focus of the study was on children and students diagnosed with ASD, 37 of the 201 respondents who did not have an accurate diagnosis or who had other behavioural and emotional/ hyperactivity disorders were excluded. Therefore, the total number of participants whose results were analysed was 164. Due to the fact that there are missing responses for some of the indicators, in the results presented, the responses vary and for some indicators are below 164. The most common diagnosis is F.84 ASD (118), the others are F84.8 Other pervasive developmental disorders (31) and less ASD with complications (9), F84.1 Atypical autism (5) and Asperger - only 1 (Table 3).

Table 3. *Description of respondents by sex, age and diagnosis*

Diagnosis	Sex and age	
	Boys	Girls
ASD with complications (N = 9)	N =7: 2: 7 y.o., 3: 9 y.o., 1: 12 y.o. and 1: 13 y.o.	N = 2: 7 and 16 y.o
Asperger (N = 1)	N = 1: 14 y.o.	-
Atypical autism (N = 5)	N = 2: 7 y.o. and 8 y.o.	N = 3: 7, 10 and 11 y.o.
F84.8 Other pervasive developmental disorders (N = 31)	N = 24 1: 3 y.o., 3: 4 y.o., 2: 5 y.o., 1: 6 y.o., 5: 7 y.o., 3: 8 y.o., 5: 9 y.o., 1: 10 y.o., 1: 11 y.o., 1: 13 y.o., and 1: 14 y.o.	N = 7: 1: 4 y.o., 2: 7 y.o., 1: 8 y.o., 1: 10 y.o. and 2: 12 y.o.
ASD (N = 118)	N = 87 1: 3 y.o., 4: 4 y.o., 8: 5 y.o., 3: 6 y.o., 18: 7 y.o., 17: 8 y.o., 14: 9 y.o., 2: 11 y.o., 4: 12 y.o., 6: 13 y.o., 4: 14 y.o., 1: 15 y.o., 2: 16 y.o., 2: 17 y.o., 1: 18 y.o.	N = 31 3: 4 y.o., 3: 5 y.o., 3: 6 y.o., 6: 7 y.o., 4: 8 y.o., 6: 9 y.o., 1: 11 y.o., 1: 12 y.o., 1: 13 y.o., 2: 16 y.o. and 1: 19 y.o.

Results

The results are reported for the seven survey indicators. For each indicator, the significant differences reported by sex, age and diagnosis, are indicated. Data are summarized according to the number and percentage of children and students who have challenges and who have no challenges, respectively, on each indicator and sub-indicator. Language mastery is described by sub-indicators in Table 4.

Table 4. *Scores on speech proficiency, comprehension and use of speech for communicative purposes*

Language - language structure, rules		N	%
Remembers abstract concepts	Yes	66	43
	No	88	57
Imitates sounds and phrases	Yes	140	85
	No	24	15
Lack of speech	Yes	140	86
	No	23	14
Finds the right word	Yes	58	44
	No	75	56
Unintelligible speech	Yes	124	79
	No	33	21
Grammatically incoherent speech	Yes	33	22
	No	119	78
Understands meaning when reading	Yes	26	18
	No	116	82
Understands new concepts	Yes	60	43
	No	80	57
Uses speech for communicative purposes	Yes	100	64
	No	56	26
Merges sounds	Yes	32	21
	No	122	79
Constructs sentences	Yes	32	21
	No	123	79
Sound analysis and synthesis	Yes	66	42
	No	93	58

In respect to overall language mastery and speech development outcomes

- The main challenges are lack of speech (86%), unintelligible speech and difficulty in constructing sentences (79%), understanding the meaning in reading (82%)
- More than half of children and students with ASD have difficulties in remembering abstract concepts, new concepts and finding the right word, but 44% find the right words, 43% understand abstract concepts and new concepts, 42% cope with sound analysis and synthesis.
- Much more than half of the children and students with ASD can imitate sounds and phrases (85%) and have grammatically coherent speech (78%), 64% use speech for communicative purposes, and 79% do not merge sounds
- No gender differences were accounted
- Significant difference was found in respect to the personal support for remembering abstract concepts - 53% of children and students with short-term support, 40% of those with long-term support, and 19% of those without support remember concepts compared with 82% of those without support. 47% with short-term support, and 60% with long-term support do not remember abstract concepts ($\chi 2 = 6.795$, $p = .033$; Phi and V = .210; $p = .033$). There was also a significant difference with respect to lack of speech, which relates to 94% of children and students without personal support, 94% of those with long-term support, and 73% of those with short-term support ($\chi 2 = 14.043$, $p = .001$; Phi and V = .294; $p = .001$). Unintelligible speech occurred most frequently among children and students without personal support (94%), followed by those with long-term support (86%), and least frequently in those with short-term support (66%) ($\chi 2 = 11.347$, $p = .003$; Phi and V = .269; $p = .003$). Reading comprehension was also higher for children and students with short-term support (32%) compared to 7% for those without and 10% for those with long-term support ($\chi 2 = 11.914$, $p = .003$; Phi and V = .290; $p = .003$). The place of support emerges particularly for sentence composition, with no child in the group without support can perform with this compared with 28% of children and students with short-term support and 19% of those with long-term support ($\chi 2 = 6,460$, $p = .040$; Phi and V = .204; $p = .040$).
- There was a significant difference also by diagnosis - in terms of imitating sounds and phrases, the highest percentage of challenges were observed in the group Other pervasive developmental disorders (94%), followed by ASD (86%), ASD with complications (67%) and atypical autism (60%) ($\chi 2 = 12.698$, $p = . 013$; Phi and V = .278; $p = .013$) and in the use of speech for communicative purposes, where the highest rates were for ASD with complications (89%), followed by childhood autism (69%), atypical autism (60%), and other pervasive developmental disorders (41%) ($\chi 2 = 11,784$, $p = .019$; Phi and V = .275; $p = .019$).
- Significant differences reported by age were in imitation of sounds and phrases, where most challenges encountered 3-5 y.o., 8 and 9 y.o., 17-19 y.o. Lack of speech was prevailing (100%) for 3-6 y.o., 97% for 7-8 y.o., 100% for 11, 17 and 18 y.o. Prevalence of unintelligible speech, 100%, was among 3-5 y.o., 15 and 17 y.o. and serious challenges for 7 y.o. Coherent speech was reported without challenges for 13 y.o. and 15 y.o. 10 y.o., 11 y.o., and 15 y.o. use speech for communicative purposes (100%). For merging sounds best (100%) performed 4 y.o. and 5 y.o., 11 y.o., 14 y.o., 15 y.o., 17 y.o., and 18 y.o. Sentence composition was worst for 3-5 y.o., and best among 15 y.o., which replicates the typical development.

The results for the mastery of cause-effect relationships, the relationship between information and its practical application, and self-organization are described in Table 5.

Table 5. *Scores for challenges and performance on the indicator Thinking*

Thinking		N	%
Organisational skills	Yes	17	11
	No	139	89
Implementation of information in practice	Yes	56	36
	No	98	64
Understanding causal relationships	Yes	29	19
	No	126	81

In terms of thinking, the overall results outline

- The main challenges reported concern the organisational skills (89%) and understanding causal relations (81%), whereas more than half of the respondents are unable to apply what they have learned in practice.
- It should be noted that slightly over one third (36%) of the children and students surveyed manage to put the information into practice
- As a significant gender difference here, it appeared that more girls (22%) compared to boys (7%) had developed organizational skills ($\chi 2 = 6.999$, $p = .012$; Phi and V = .212; $p = .008$).
- For thinking, no relation was reported with the support provided
- There was a significant relation between diagnosis and organizational skills, which were highest for ASD with complications (44%), followed by atypical autism (25%), and lowest for ASD (9%) and other pervasive developmental disorders (8%) ($\chi 2 = 12{,}267$, $p = .015$; Phi and V = .280; $p = .015$).
- Age: 15 y.o. and 16 y.o. (100%) performed best in applying the information in practice and well performed (50%) 3 y.o., 10 y.o., 11 y.o., and 12 y.o. Causal relations were understoom best by 18 y.o. and 19 y.o. and worst (0%) among 17 y.o., 14 y.o., 15 y.o., 11 y.o., 5 y.o., 6 y.o., and 3 y.o.

The components of interpersonal interactions are outlined in Table 6.

Table 6. *Challenges and resources outlined for interpersonal interactions*

Interpersonal interactions		N	%
Emotional regulation	Yes	25	16
	No	135	84
Initiation and appropriate response to social interactions	Yes	35	22
	No	125	78
Socially acceptable response to physical contact	Yes	52	33
	No	106	67
Socially acceptable behaviour	Yes	38	24
	No	119	76

In respect of interpersonal interactions the summarized results indicate that

- Major challenges are observed in emotional regulation (84%), initiating and adequate involvement in social contact (78%), and socially acceptable behaviour (76%)
- Although more than half of children and students with ASD studied do not respond in a socially acceptable manner to physical contact, it shall be noted that one-third (33%) respond appropriately and one-fifth (24%) demonstrate socially acceptable behaviour
- No gender differences were reported
- Socially acceptable behaviour was found to have a significant relationship with support provided, with best performance of children and students with short-term support (36%), followed by those with long-term support (17%) and no support (14%) ($\chi 2 = 7.165$, $p = .028$; Phi and V = .214; $p = .028$).
- There was a significant relation between diagnosis and initiating and responding appropriately to social interactions; this was reported for 37% of children and students with other pervasive developmental disorders, 22% of those with ASD with complications, 18% of those with ASD, and 0% of those with atypical autism ($\chi 2 = 9.692$, $p = .046$; Phi and V = .246; $p = .046$).
- In respect to age emotional regulation was worst among 3-5 y.o., 11 y.o., 15 y.o., 17-19 y.o. Responding appropriately to physical contact was greatest challenge (0%) for respondents aged 3-5 y., 17-19 y. and was best (100%) for 15-16 years old.

Attention and perception scores are described in Table 7.

Table 7. *Attention and perception challenges and resources*

Attention and perceptions		N	%
Holds attention for a short time	Yes	140	85
	No	24	15
Has difficulty sitting still in class	Yes	140	86
	No	23	14
Does not listen or respond to instructions	Yes	123	79
	No	33	21
Relies on peers and copies their actions	Yes	32	21
	No	122	79

For attention and perceptions, the results reveal that

- The main challenge for the children and students with ASD is to hold attention (85%) and, respectively, to remain sitting still during class (86%), listening and responding to instructions (79%), and lack of mastery of peer behaviour patterns (79%)
- One-fifth of the respondents are able to learn by role models of peers, listen and respond to instructions, and over one-tenth cope to hold their attention for long periods of time
- No gender differences were observed
- There was a significant difference in the support provided - again, the highest percentage of children and students who perceive and respond to instructions was in the group with short-term support (34%), followed by children and students with long-term support (14%) and only 6% in the group without support ($\chi 2 = 11.145$, $p = .004$; Phi and V = .067; $p = .004$). Children and students with short-term support were more likely (27%) than those with long-term support and no support to be able to sit still in class ($\chi 2 = 14{,}043$, $p = .001$; Phi and V = .294; p =.001).
- Significant differences by diagnosis was accounted in attention retention, with children and students with atypical autism performing best (40%), followed by those with ASD with complications (33%), ASD (14%), and least (7%) for other pervasive developmental disorders ($\chi 2 = 12.698$, $p = .013$; Phi and V = .278; $p = .013$).
- Age: Attention retention was most difficult in 3-5, 8-9, 17-19 y.o. 100% unresponsive to instructions are 3-5 y.o., 15 and 17 y.o. Imitation of peers was best (100%) for 10 and 19 y.o. and worst (0%) among r 4, 5, 11, 14-15 17-18 y.o. Difficulties to sit still in class have mainly 3-8, 11, 17 and 18 y.o

The results for educational outcomes are presented in Table 8.

Table 8. *Results for challenges and coping in terms of educational outcomes*

Educational performance		N	%
Encounters challenges only in some areas	Yes	28	19
	No	120	81
Learning is according to an individual plan	Yes	43	41
	No	61	59
Works cooperatively with other children	Yes	18	12
	No	136	88
Copes with the group tasks	Yes	20	13
	No	137	87

In respect to the educational outcomes it should be noted that only 41% of the respondents have an individual learning plan, and more than half (59%) have no individual schedule, which is likely linked to performance on the indicators

- The majority of the respondents have challenges in more than one area (81%) do not cope with the group tasks (87%), and do not work collaboratively with peers (88%)
- At the same time one tenth of children and students with ASD manage to work cooperatively with peers and cope with the set tasks, and one fifth have challenges only in some areas
- No significant differences were reported by gender and individual learning plan

- 19% of children and students with short-term support, 8% of those with long-term support and none of those without support (14%) worked collaboratively with their peers ($\chi 2 = 6,291$, $p = .043$; Phi and V = .202; p =.043).
- In terms of working collaboratively with others a significant relationship with diagnosis was accounted, with children with atypical autism (25%) and other pervasive developmental disorders (24%) interacted more than those with ASD with complications (13%) and ASD (7%) ($\chi 2 = 14.844$, $p = .005$; Phi and V = .310; $p = .005$). In terms of coping with general tasks the highest percentage of performers were in the group with ASD with complications (25%), followed by other pervasive developmental disorders (17%), ASD (11%), and 0% in atypical autism ($\chi 2 = 9,693$, $p = .046$; Phi and V = .248; $p = .046$).
- In respect to age best performed (100%) 15, 18, and 19 y.o. Worst results for cooperative work with peers (0%) had 3-6 y.o., 15 and 17-19 y.o. and best performed 10 y.o. Worst performance with group tasks (0%) have 3, 5, 6, 10, 15, and 17-19 y.o.

The results for social interactions and communication are summarized in Table 9.

Table 9. *Results for challenges and resources in social communication*

Social communication		N	%
Uses inappropriate voice volume/intonation	Yes	81	53
	No	72	57
Makes off-topic comments	Yes	42	29
	No	103	71
Keeps the conversation going	Yes	33	21
	No	124	79
Often changes the subject	Yes	38	26
	No	106	74
Laughs at inappropriate times / rude behaviour	Yes	84	54
	No	72	46
Conscious use of eye contact	Yes	74	47
	No	83	53

For social communication it can be summarized that

- The main challenge is in maintaining a conversation (79%)
- As positive result, equal number of children and students with ASD use appropriate voice volume and intonation, and 47% consciously engage in eye contact
- As a major strength, it can be highlighted also that most children and students with ASD do not tend to change the subject (74%) and do not make off-topic comments (71%)
- No differences were reported for gender and personal support
- Age: most challenges to keep conversation (0%) had 3-6 y.o.

Memorization of instructions and the need instructions to be repeated is presented in Table 10.

Table 10. *Scores for auditory memory challenges and coping*

Auditory memory		N	%
Forgets instructions	Yes	91	62
	No	56	38
Needs constant guidance	Yes	139	88,5
	No	18	11,5

For auditory memory, the results show that

- The main focus should be on the need for constant guidance (accounted for 88.5% of the respondents) as more than half of children and students tend to forget instructions
- However, it shall be noted that 38% of the respondents do not forget and respectively follow the instructions

There were no differences noted for either gender, nor according to the personal support.

Discussions

ASD is a neurodevelopmental impairment characterized by deficits in social communication and the presence of restricted interests and repetitive behaviours (APA, 2013). The heterogeneity of ASD is the object of numerous studies describing specific disturbances. These have been outlined for mental functioning in particular in children (Simonoff et al., 2008) and physical health (Cashin et al., 2018). Ashburner et al. (2010) outline deficits within the mainstream school in terms of emotion regulation and learning. Lifelong development impairments have also been outlined, in professional and social life of adults (Levy and Perry, 2011; Howlin et al., 2013; Schmidt et al., 2015).

Table 11 summarizes the challenges, resources and specificity for the 7 studies areas.

Table 11. *Summarized results*

Functional areas	Challenges	Resources	Specificity
overall language mastery and speech development	lack of speech / unintelligible speech; difficulty in constructing sentences, understanding the meaning in reading difficulties in remembering abstract concepts, new concepts and finding the right word	more than half of the children and students with ASD can imitate sounds and phrases and have grammatically coherent speech, use speech for communicative purposes, and do not merge sounds of the children and students half find the right words, understand abstract concepts and new concepts, cope with sound analysis and synthesis	Ensured support is rather important for positive outcomes Age and diagnosis have also specific effect
thinking	main challenges reported concern the organisational skills and understanding causal relations; more than half of the respondents are unable to apply what they have learned in practice	slightly over one third of the children and students surveyed manage to put the information into practice	Gender, diagnosis and age have to be taken into account
interpersonal interactions	major challenges are observed in emotional regulation, initiating and adequate involvement in social contact, and socially acceptable behaviour	one-third respond appropriately; one-fifth demonstrate socially acceptable behaviour	Ensured support is rather important for positive outcomes Diagnosis and age have specific effect
attention and perceptions	the main challenge for the children and students with ASD is to hold attention and, respectively, to remain sitting still during class, listening and responding to instructions, and lack of mastery of peer behaviour patterns	one-fifth of the respondents are able to learn by role models of peers, listen and respond to instructions; over one-tenth cope to hold their attention for long periods of time	Ensured support is rather important for positive outcomes Diagnosis and age have to be taken into account
educational outcomes	the majority of the respondents have challenges in more than one area, do not cope with the group tasks, and do not work collaboratively with peers	one tenth of children and students with ASD manage to work cooperatively with peers and cope with the set tasks; one fifth have challenges only in some areas	Ensured support is rather important for positive outcomes Diagnosis and age have to be taken into account

Functional areas	Challenges	Resources	Specificity
social communication	the main challenge is in maintaining a conversation	most children and students with ASD do not tend to change the subject and do not make off-topic comments; equal number of children and students with ASD use appropriate voice volume and intonation; half of them consciously engage in eye contact	Some age specificity can be accounted
auditory memory	accounted need for constant guidance, as more than half of children and students tend to forget instructions	38% of the respondents do not forget and respectively follow the instructions	

In reply to RQ1 more common features than differences had been accounted. Important role has the provided additional support. Some specific effects of diagnosis, age, and gender outlined, can be informative what teachers and educators can take into account. This is supported by the ratio of children and students having and not having additional support, which is almost equal.

In reply to RQ2 the results reveal a further implication of the scorecard, which enables teachers and educators in easy and smooth follow-up activities. The instrument and expertise furthermore are supposed to have important role in inclusive setting, empowering users in respect to their expertise and giving indication when and what kind of expertise they can claim.

In reply to RQ3 in can be replicated once again the importance of individual work. The common features, both concerning challenges and resources, lead to the robust conclusion was again. Only taking in account the personal profile, but not relying on and following general indicators, can be beneficial for support of children and students with ASD and their families.

Key areas of challenge, areas of support, and strengths in the general population of children and students with ASD are outlined in our investigation. Irrespective of the difficulties, the fact that at least one tenth of children and students with ASD manage to master language, the auditory memory and self-regulation stand out in all the indicators. Social interaction and task performance are not impaired with appropriate supports.

The main challenges for the children and students with ASD in our analyses are the prevalence of lack of speech, unintelligible speech and difficulties in constructing sentences, understanding the meaning in reading, remembering abstract concepts, new concepts and finding the right word, mastering organisational skills and understanding causal relationships, integrating knowledge into practice, emotional regulation, initiating and adequately engaging in social contact, attention deficits, listening and responding to instructions. The majority of respondents have difficulties in more than one area, are unable to cope with group tasks, and are unable to work collaboratively with their peers.

Notably, most of the children and students with ASD do not tend to change the subject and do not make off-topic comments. Well over half of the children and students with ASD can imitate sounds and phrases and have grammatically coherent speech, use speech for communicative purposes, and do not blend sounds. Half of the respondents use appropriate vocal volume and intonation, and make conscious eye contact. Almost half of the respondents find the right words, understand abstract and novel concepts, and engage in sound analysis and synthesis. One-third of children and students with ASD respond appropriately to social interactions, including remembering and following instructions. One-fifth demonstrate socially acceptable behaviour, are able to learn from peer modelling, listen and respond to directions, and more than one-tenth are able to maintain attention for long periods of time and have challenges in only some areas. One-tenth of children and students with ASD are able to work cooperatively with peers and complete tasks.

In the face of the challenges outlined, especially in recent studies the focus shifted to highlighting the strengths, capacity, and performance of individuals with ASD. In particular, the capacity of attention to detail has been reported (Baron-Cohen et al., 2009). Conclusions reveal further how the difference in information perception and processing leads to coping with tasks given visuospatial information process-

ing and auditory perception (Happe and Frith, 2009; Remington and Fairnie, 2017). Particular attention is drawn to the better auditory discriminative abilities and responses of individuals with ASD compared to typically developing individuals (Remington and Fairnie, 2017), and that research practice should focus on describing different interpretations rather than remaining with a difficulties focus (Grissom et al., 2024). In addition to the direction outlined for a personalized approach, specific educational approaches for individuals with autism have been proposed, including machine learning to increase fidelity in meeting their unique needs (Hajjej et al., 2024), improving performance through building intraverbal skills in adolescents (Karetnikova, *2024*).

ASD appears more frequently in males than in females with a male-female ratio of 4-5:1 (Vicari et al., 2019). There are no significant differences reported by gender, suggesting, contrary to many studies, that difficulties have common specificities across both genders and that when a differentiated complex assessment is used, the similarities rather than differences are highlighted. This is further supported by the significant differences reported in diagnosis and personal support provided. Age also plays a role.

All this suggests that a comprehensive and differentiated assessment can only be adequate to outline a profile of personal development and that setting expectations and limits can have a guiding effect, but only after individualizing the profile of each child/student.

The results replicate the acknowledgement of the difficulties outlined in research on children and students with ASD , mainly in the area of communication and the need for an individualized approach (Bagetti et al., 2023), highlighting the heterogeneity and significant percentage of coping children and students. This also relates to the limited social communication characteristic of ASD (Durkin, 2019), which research also confirms is not straightforward.

Rather, we view the results as confirmation of individualising the approach (Hayden-Evans et al., 2022) and tailoring to individual characteristics [4; 6] and creating an appropriate and relevant learning environment (Bystrova et al., 2017; Shah et al., 2019) and biopsychosocial context (Vallefuoco et al., 2022).

The outlined findings focus on considering all strengths and resources and embedding them in a real inclusive environment where children and students with ASD can flourish (Okoye et al., 2023; Narciso et al., 2024). The findings of this study align with prior international research that utilized the ICF-CY framework to delineate profiles of individuals with Autism Spectrum Disorder (ASD) across various domains of functioning. These results corroborate the conclusions of earlier investigations (e.g., Mahdi et al., 2018; Balsa, 2023, Damyanov, 2024), which underscored the critical importance of individualized assessment and support strategies accounting for contextual and environmental factors. This congruence between theoretical underpinnings and empirical evidence substantiates the utility of the ICF-CY framework in formulating inclusive education plans and long-term support for children and students with ASD.

The main limitation of this study is the disproportion of girls and boys and the different diagnoses and especially the small number of respondents in different age groups. All the differences reported suggest the need for further research. However, the similarities and resources outlined support the conclusion for the specific role of the context and the need to involve and inform a wider range of participants in the inclusive environment. Empowering families, general teachers and children and students with guidelines can promote and support the optimal developmental context for children and students with ASD.

Conclusions

The use of a comprehensive toolkit for optimal individualized profiling of strengths and challenges in the developmental process and interaction with children with ASD is important to facilitate professionals in recognizing and managing their observations in the process of interacting with children with ASD, and can also be used to inform the broader range of those who interact with children and students with ASD in inclusive settings. Awareness of mainstream teachers, peers, and families of the key areas for support and how to facilitate communication can provide a broader supportive framework and understanding of mechanisms for effective interaction, addressed to strengths but not to challenges. The fact that no significant difference by gender emerged in this study is indicative that when considering general indicators of coping, it is the support provided and environmental factors that lead the way. The main focus should be on the need for constant guidance and ensuring supportive context. Children and students with ASD obviously respond adequately to the environment and have no challenges when all we speak the same

language. The main contribution of this study is empowering teachers and educators to have active part along with medical and other professionals in early screening and intervention and promotion of personal development of children and students and the provided universal tool, adapted for their field of expertise.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of interests

The authors declare no conflict of interest.

Data availability statement

The original contributions presented in the study are included in the article, further inquiries can be directed to the corresponding author.

Institutional Review Board Statement

The study was approved by the Expert Council of the Regional Center for Support of the Process of Inclusive Education (RCSPIE) in Sofia City for letter No. 2222-6 dated 08.06.2023 assigning implementation of the project BG05M2OP001-3.018-0001 Support for Inclusive Education under the Operational Programme Science and Education for Smart Growth 2014-2020, assigned by the Bulgarian Ministry of Science and Education. The Expert Council / the Institutional Review Board/ approved also publication of the data with statement No 2 / 6 February 2025.

Informed Consent Statement

Informed consent was obtained for all subjects involved in the study.

Author Contributions

Milen Zamfirov - conceptualization, supervision, investigation, writing—original draft preparation, project administration; Margarita Bakracheva - conceptualization, supervision, writing - original draft preparation; Kaloyan Damyanov - conceptualization, supervision, writing - original draft preparation; Lyudmila Filipova Belenska-Todorova - data curation, formal analysis, validation, visualization, writing – review and editing; Polina Daskalova-Petkova - data curation.

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